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Erratum: “High conductance states of single benzenedithiol molecules” [Appl. Phys. Lett. 89, 163111 (2006)]

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The authors have recently reported on the high conductance states of a BDT (1,4-benzenedithiol) molecule bridging over Au electrodes.¹ In the experimental conductance histograms, we observed a high-conductance peak around $0.1G_0$, as well as relatively sharp low-conductance peaks at $\sim 0.1G_0$ and $\sim 0.005G_0$. Though the $0.01G_0$ peak is consistent with the reported conductance of BDT,² these sharp low-conductance peaks do not agree with recent conductance measurements made by Ulrich *et al.*,³ and Kiguchi *et al.*,⁴ who observed only a tiny peak around $0.005G_0$. In our previous publication, we measured the junction current by detecting with an oscilloscope a voltage drop across a resistor. Though this method can allow us to study short-lived junction states, it is not suitable for measuring low junction currents through molecular junctions. Therefore, we remeasured the Au/BDT/Au junction conductance using a picoammeter and obtained a new histogram shown in FIG. 1. The new histogram reveals a small and broad feature around $0.005G_0$ but no sharp peak structures. The histogram agrees with those reported in Refs. 3 and 4. Hence we retract statements related to the sharp peak features, L-1 through L-3, in our previous paper.¹ This, however, does not mean that the conductance states at $0.01G_0$ and $0.005G_0$ are non-existent. In our new measurements with the picoammeter, we could observe conductance plateaus appearing at these conductance values. These plateaus are not, however, narrowly distributed in their conductance to produce sharp peaks in the histogram. Concerning the $0.1G_0$ conductance state, our new measurements at 1.0 V reproduce a peak at $0.1G_0$ in the histogram as shown in FIG. 2. Therefore, no corrections are necessary on the existence of the $0.1G_0$ state in Au/BDT/Au junctions, its preferential appearance under high biases, and related statements made in Ref. 1.

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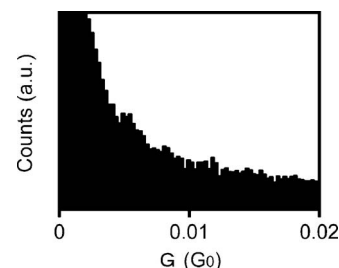


FIG. 1. Conductance histogram of the Au/BDT/Au junction in Ar atmosphere re-measured with a picoammeter. The bias is 0.05 V, and 441 traces acquired during the junction closing are accumulated.

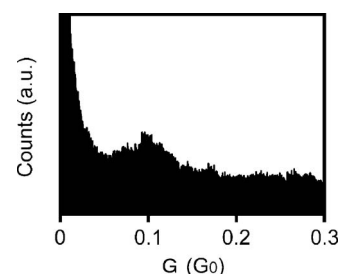


FIG. 2. Conductance histogram in the high-conductance regime obtained at 1.0 V with 901 traces acquired during the junction opening and closing, are used to construct the histogram. The measurements were made in Ar atmosphere.

A typographical correction: in FIG. 2(a), the conductance unit $0.01G_0$ should have been $0.1G_0$.

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